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THE ST. CLAIR AVENUE BRIDGE*

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Prior to 1909 there existed on St. Clair Avenue, between Bathurst Street and Spadina Road, a small wooden bridge which spanned Black Creek. In 1909 a reinforced concrete culvert (6 ft. x 6 ft.) was built at this location, and an earth embankment twenty feet in height was constructed across the ravine. In 1911 it was decided to regrade and widen St. Clair Avenue and to build the now existing St. Clair Avenue Civic Car Line. The width of the street was fixed at one hundred feet, and at Black Creek the height of the embankment was raised from twenty to fifty feet, which necessitated the extension of the culvert to a total length of two hundred and seventy-two feet. This extension was made from the same design as was used for the portion then existing.

In January, 1912, a temporary trestle was built upon the old embankment and a burrow pit opened up, just west of the ravine. Two steam shovels and a work train were used. This filling, being nearly all done during cold weather, was in a more or less frozen condition. On June 26th, 1912, it was discovered that portions of the culvert had failed, the roof having fallen in. The collapsed portions were in the newly constructed culvert, the older part remaining intact. The probable reason for failure was, that the earth, as it thawed out, settled on the top of the culvert without arching itself over the culvert, as the design, no doubt, intended that it should do. The older part of the culvert, with the previously placed fill not collapsing, bears out this theory.

The failure of the culvert and its necessary repair re-opened the question of providing an opening for a driveway in the ravine. Several conditions favored this proposition. Sir Henry M. Pellatt had donated a one hundred foot strip of land in the ravine for this purpose and there was no means of continuing this proposed driveway to the north without constructing a bridge in the embankment at St. Clair Avenue. The owners of the flats to the north were claiming heavy land damages on account of the embankment cutting off their ingress and egress. The construction of a bridge and the building of a road in the ravine would combat these damage claims to a great extent.

In the summer of 1912 the City Council decided to construct a bridge with an opening of one hundred feet. The Railway and

† Structural Designer, Bridge Dept., City Hall, Toronto.

Bridge Department prepared plans for a deck plate girder bridge with a concrete span of 100 feet and two approach spans of 40 feet, with a total deck width of 90 feet (handrail to handrail) and a clear distance between curbs of 69 feet, the substructure to be composed of concrete piers and abutments bearing on pile foundations. The bridge is skewed at an angle of 23° to the centre line of St. Clair Avenue and is on a .67 per cent grade.

The plans were approved and contracts let in the early summer of 1913 to the McGregor & McIntyre Company for the structural steel work, and to Scott & Law for the piling and concrete work.

The first work to be done was to repair the culvert and excavate a site in the embankment for the bridge. When the excavation was completed a temporary timber trestle was built to accommodate

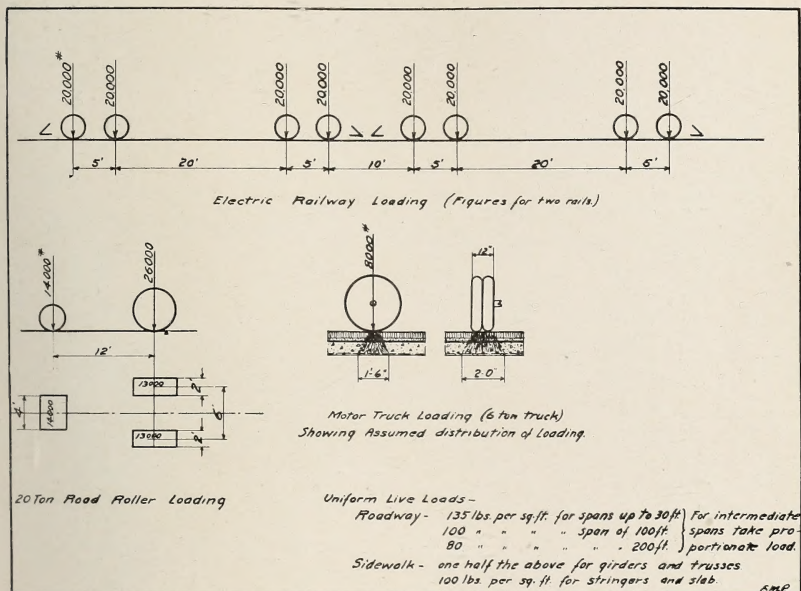
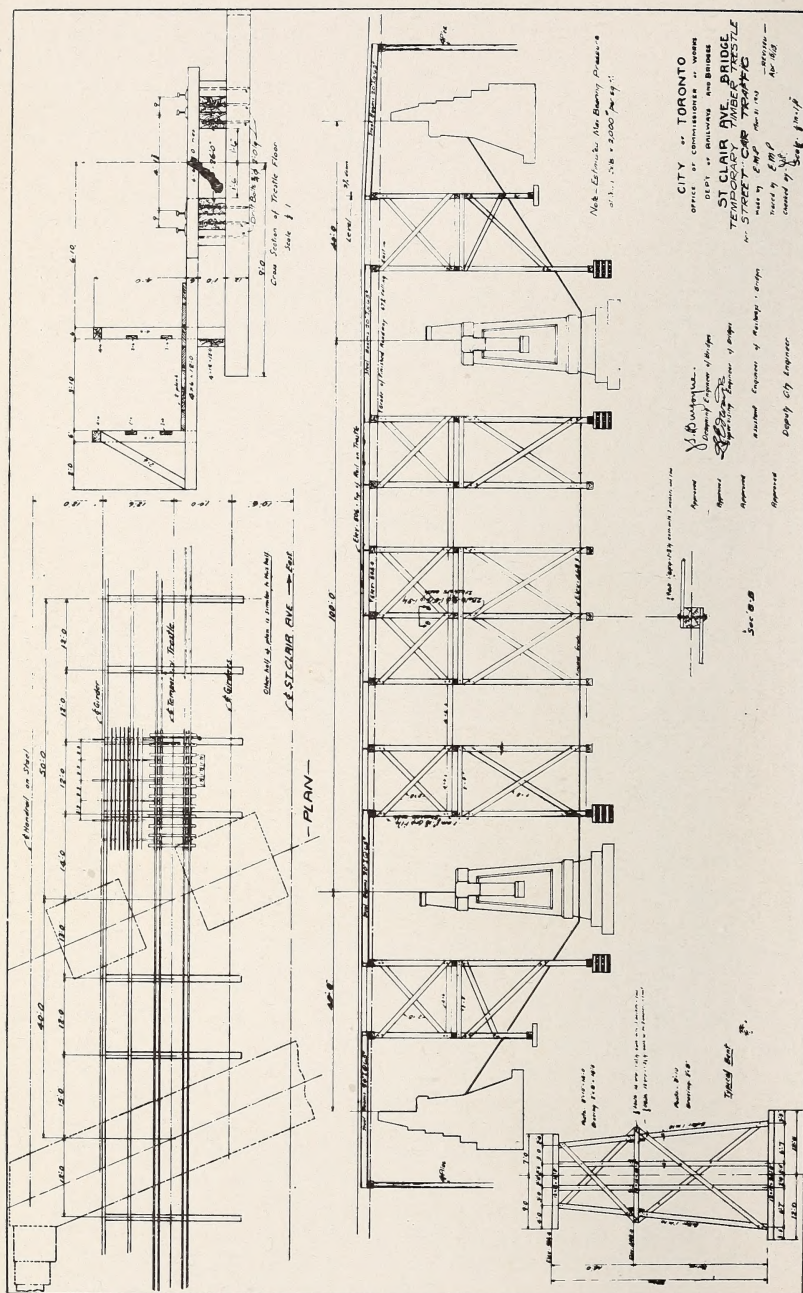


Fig. 2—Loading Specifications

the Civic Street Railway and pedestrian traffic. The Civic Street Railway was not ready to operate till several weeks after the trestle was completed. This trestle was so constructed that the new bridge could be built without interfering with the street railway traffic. This was accomplished by bridging over the spaces occupied by the piers and abutments with steel beams, which could be easily removed when it was necessary for the pile driver to pass through; this was always done at night when few cars were running. The two street railway tracks were merged into a gauntlet track on the trestle. This construction did away with the necessity of the cars stopping and turning a switch at the ends of the trestle, and brought the cost of the trestle down to a minimum. The operation of this gauntlet proved very satisfactory, very little inconvenience resulting



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REPORT ON ALTERNATIVE # 1020

ST CLAIR AVE BRIDGE

ST. CLAIR TEMPORARY JVE. BRIDGE TIMBER TRUSTLE

STREET CAR TRAFFIC

made by E. M. J. May 21 1893

Traced by EMP
—REVISED—
Apr 16/19

checked by J.P.

Scap. 8/10-1/18

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D. 9-52.

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to the operation of the Civic Car Line. The City did all this preliminary construction by day labor.

The specifications for the permanent bridge were the City of Toronto's and Ontario Railway and Municipal Board's specifications. The item of most interest in the specifications is the loadings assumed. See Fig. 2.

The ground on which the permanent bridge was to be built is all filled-in-material and below that rather soft soil, it was necessary, therefore, to resort to piling for a proper foundation. Piles were supplied according to the following specifications:—"Piles shall be of white oak, of straight, live timber, free from cracks, shakes, rotten knots, or other blemishes. They shall be so straight that a straight line taken in any direction and run the length of the pile

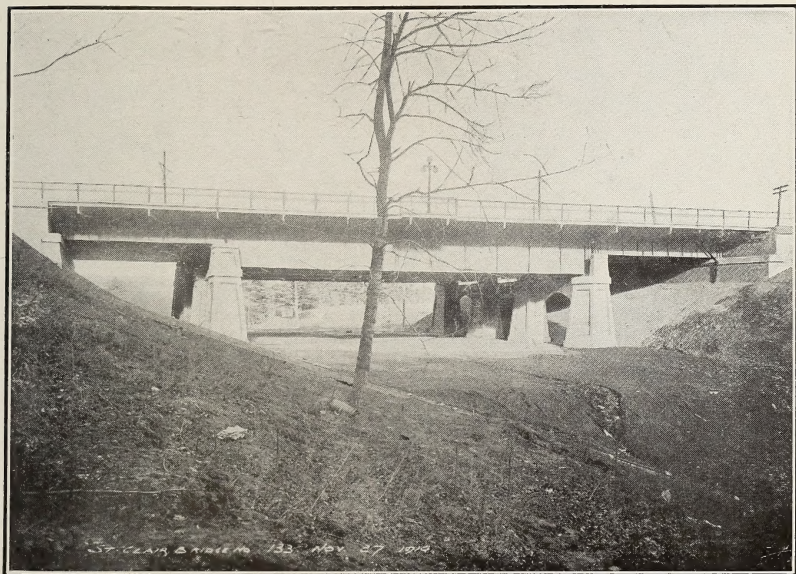


Fig. 4—General View of Finished Bridge.

shall show that its centre is at no point over four inches out of a straight line. They shall show an even, gradual taper from end to end and must not be in diameter less than eight inches at the point and not less than sixteen inches at the butt. The ends shall be cut square, the body barked and all knots trimmed smooth."

The pile driver used was an Arnott four-ton double acting steam hammer, with the following dimensions:—stroke 21", diameter of piston $9\frac{1}{2}$ ", steam pressure (working) 60 pds. per sq. in., the energy of each blow figures out to be 10,000 ft. pds., 110 blows per minute were delivered to the pile. Most of the piles were driven to refusal. An idea of the force of the blow of the hammer can be obtained from the following incident. A $\frac{3}{8}$ " bolt broke, somewhere

on the hammer, and the nut and a part of the bolt dropped onto the plate at the head of the pile and before the steam could be shut off, the hammer struck it one blow, flattening the bolt and nut to $\frac{1}{8}$ " thick. Although the tops of the piles are not below water level yet the perpetual dampness of the clay soil keeps the piles wet and prevents decay. The calculated loading for each pile was fifteen tons.

The abutments and piers are built of mass concrete with local reinforcement. The concrete mix was 1:3:5 below underside of coping and 1:2:4 above. The abutments are 26 feet high and 100 feet long with 20-foot wing walls parallel with the street line. The base of the main wall is 13' 3" wide. Reinforcing steel (square twisted rods) is supplied in the base over the piles, under the bridge

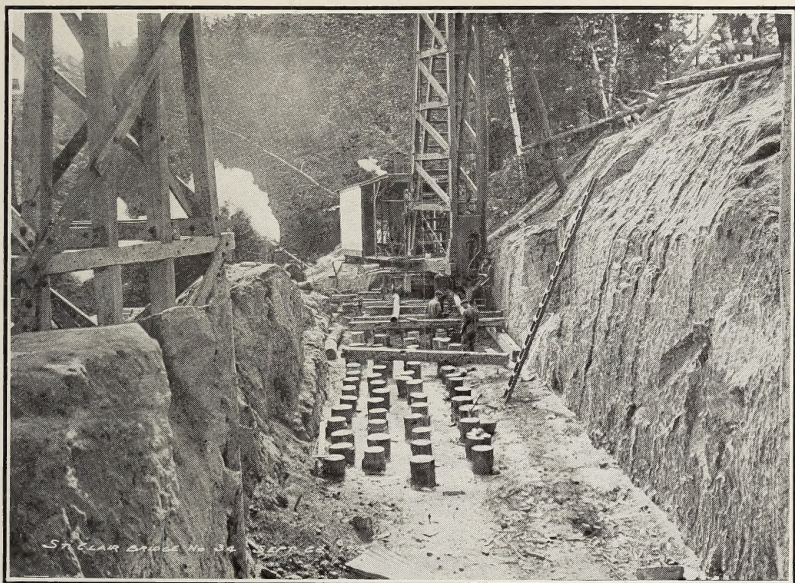


Fig. 6—Piling in west abutment showing piles "cut off."

seat, at the rear of the back wall and around the corners. No expansion joints were used.

The piers are about 10 feet square at the ground line and taper up at a batter of 1 in 12. They are 15 feet square at the top of the piling. From base of piers to roadway is about 40 feet. The piers are panelled on four sides and are joined transversely by means of a concrete strut which is constructed in the shape of an arch. On top of the piers is a concrete pedestal 6' 2" high on which rest the 40-foot girders. These pedestals are doubly reinforced by 6-1" sq. twisted rods bent in the form of an inverted U, the assumption in the design being, that the pedestal has to withstand the expansion and contraction forces of the 40-foot girders caused by the friction between the

bearing plates. Reinforcing steel is also supplied along the top of the piers and struts and diagonally through the arched portions of the struts.

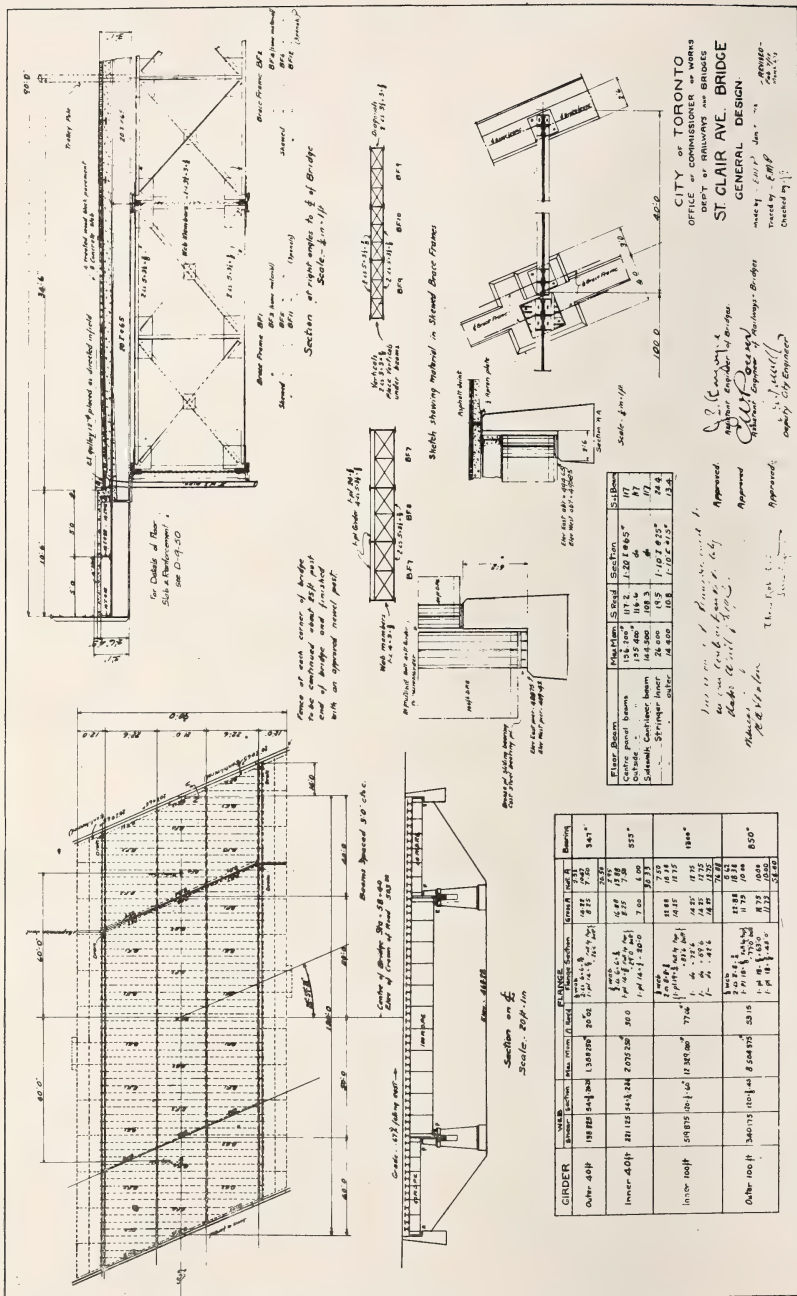
The finishing of the exposed concrete surfaces is best described by quoting an extract from the specifications, "As soon as the forms are removed and all cavities filled, the concrete surfaces shall be thoroughly rubbed with cement grout compound of one part cement to two parts fine sand until all irregularities in the surface are filled, after which the whole surface shall be gone over with a piece of sandstone or carborundum brick and ground down sufficiently to remove all irregularities. The grout surfacing herein specified shall, in no case, be used for the purpose of producing a plaster coating to cover irregularities in the surface, produced by sagging or similar defects



Fig. 8—Showing Method of Laying Tracks on Bridge Floor.

in the forms. Care must be taken that the surfaces so treated shall be thoroughly wet before the grout is applied."

The steel work of the bridge consists of four rows of girders, the centre span 100 ft. and the two outer spans 40'; 20" I beams at 65 lbs. spaced 3 ft. centres rest directly on top of these girders. Every fifth beam cantilevers out to carry the fence and sidewalk stringers. An ornamental iron fence extends from end to end of wing walls on each side of the bridge. The girders are the common plate and angle type; the flange of the inside 100-ft. girder is made up of 2 angles 8" x 8" x $\frac{3}{4}$ " and 4 cover plates 19" x $\frac{3}{4}$ " which with one eighth of the web gives a net flange area of 76.88 sq. in. This particular girder weighs 40 tons. Cross frames composed of angles



are placed about every 18 feet centres between the girders. No horizontal diagonal bracing was used, the great width of the bridge and also the solid type of reinforced concrete floor used making this type of bracing unnecessary. The trolley poles are placed in the centre of the roadway and are carried in an 8" diam. iron pipe socket about 3 feet deep, which is supported on beams between the floor beams. This construction permits the easy removal of the trolley pole when necessary, the pole being merely wedged in the socket and a cast iron wheel guard placed around the base.

The expansion joints are so arranged as to be invisible from the finished bridge floor, the paving and waterproofing being carried

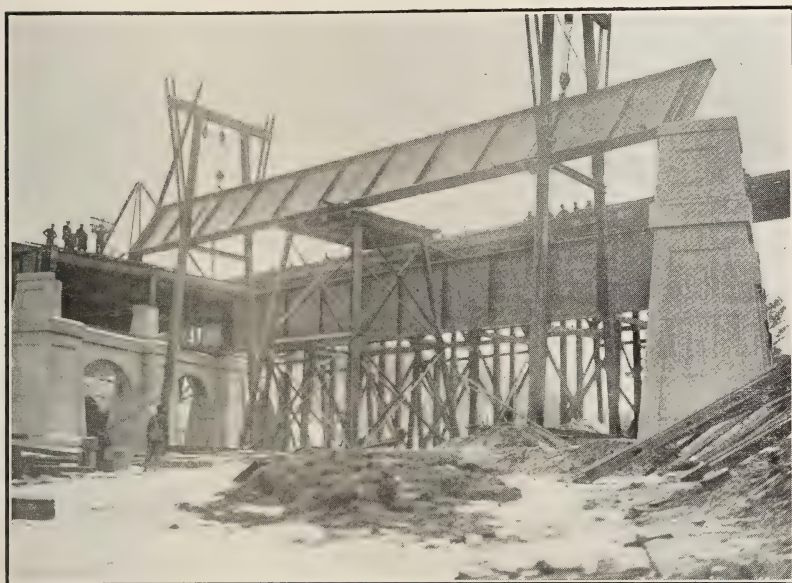


Fig. 10—Erection of One of Inner 100 ft. Plate Girders.

right over the joint. The expansion joint in the bridge floor is constructed of two vertical web plates, cut on top to the curve of the roadway and fastened at the base by means of an angle to the floor beams. To the top of each of these plates is riveted an angle also bent to the curve of the roadway, a cover plate riveted to one of these angles and free to slide over the top of the other completes the expansion joint. On account of the skew of the bridge and the fact that the street railway rails had to pass through the expansion joint, the detailing of this joint proved a little intricate. The expansion joints at the abutments are the usual apron plate type, with an asphalt joint between the concrete of the bridge floor and the concrete base for the pavement of the approach.

Structural steel catch basins are provided at various points in the bridge floor, these are connected to the creek below by four

inch drain pipes. The sides of these catch basins have a batter of 3 in 12 to destroy the expanding force of ice, if the basin happened to be full of water in cold weather.

The pier members of the 100-foot girders at the sliding ends consist of a cast steel bed plate with a phosphor bronze plate inset into the top of it, while another bronze plate inset into the under side of the bearing plate of the girder completes the expansion bearing. At the fixed ends the bronze plates are omitted. The bearings for the 40 ft. girders are the ordinary steel plate type. This type of bronze plate expansion joint has given very good satisfaction so far.

In the design of the fence we were confronted with these two conditions; to make a strong fence and to make it pleasing in appearance. There have been several accidents lately in which the bridge



Fig. 11—View Showing Construction of Fence and Method of Reinforcing Sidewalk Slab.

fence was the only thing between a motor car and the ravine below, and the policy of the city now is, to build good stout fences on their bridges. The fence, as built, consists of 18 inches at the top of scroll work made of $1\frac{1}{4}$ " x $\frac{1}{4}$ " bars and 27" of 45° lattice work at the base, made of $1\frac{1}{4}$ " x $\frac{1}{4}$ " bars, and is 4 feet high. A Carnegie handrail tee section No. 154 with one $1\frac{1}{4}$ " x $1\frac{1}{4}$ " x $\frac{1}{4}$ " angle underneath to connect the scroll work to, composes the top chord, a $2\frac{1}{2}$ " x 2" x $\frac{1}{4}$ " angle separates the scroll from the lattice work and a $2\frac{1}{2}$ " x 2" x $\frac{1}{4}$ " angle three inches from the sidewalk slab completes the fence. 5" x 3" tees at 13.6 lbs. at 7' 6" centres are used for fence posts. The scroll work and latticing were so designed as to be continuous in appearance at the fence posts.

The steel work was fabricated and erected by the McGregor & McIntyre Company. The transportation of this heavy steel from their plant on Shaw Street to the bridge site over the city streets, a distance of two miles, was admirably solved by the presence of good sleighing. The 100-ft. girders were loaded, flatwise, on two heavy sleighs, the tractive force being supplied by a large six-ton motor truck and a hoisting engine. When the motor truck could not start the load or when the grade was too steep, the hoisting engine, which was on skids, was snubbed to a telephone pole ahead of the load and a wire cable attached to the load; then with both the truck and hoisting engine no difficulty was experienced in moving the load. In this manner a grade as high as $7\frac{1}{2}$ per cent. was successfully negotiated. On flat grades and generally on light grades the



Fig. 12. Showing the three stages of waterproofing.

motor truck had no difficulty in "walking right along" with its 40-ton load. It took, on an average, a day to transport one of those big girders to the site, the many corners to turn and the numerous heavy grades to go up and down occupying most of the time. Every time the sleighs stopped for any length of time the runners would freeze tight, necessitating the use of jacks to get started again.

The erection of the small steel was mostly done by means of a hand derrick and gin pole. The 100-ft. girders were erected in the following manner:—The girder was laid down flat and hauled, by means of two gallows frames, into position where it was supported, upon its side, on a platform. The girder was then lifted up till it

was standing vertical, and then, after taking away the platform, was lowered into place. Two hoisting engines were used in this work, one for each gallows frame.

After the steel was in place and riveted up, the concrete floor, consisting of a 7-inch reinforced concrete slab, was laid. The reinforcing used was, one layer No. 23 triangle mesh and 7-16" square twisted rods at 8-inch centres. The sidewalk slab is 4 inches thick with one layer of No. 23 triangle mesh reinforcing. The floor beams with the exception of the cantilevered portions and the sidewalk stringers are encased in concrete. 1:2:4 concrete was used in this work.

The concrete floor slab was waterproofed in the following manner:—

First—The surface was thoroughly cleaned by means of a hose and brooms.

Second—The surface was well swabbed over with hot asphalt.

Third—Three layers of 8-oz. burlap were well swabbed on with hot asphalt, the burlap being laid shingle fashion.

Fourth—One inch asphalt mastic was spread on top of the burlap. At the expansion joints the burlap was doubled upon itself to allow for expansion.

On top of the asphalt mastic was spread one inch of sand and cement mixed dry on which base a four inch creosoted wood block pavement was laid.

The rails were fastened to creosoted wood blocks 12" x 12" x 4" laid 3 ft. centres. The method of fastening was by means of 4-7/8" screw spikes, screwed into holes that had been bored into the blocks before creosoting. These blocks rest in a trough provided in the concrete floor which, after the rails had been properly lined up, was filled in with concrete.

The paint used was as follows: 1 shop coat red lead mixed with 22 lbs. red lead (94 per cent. pure) to one gallon pure raw linseed oil. 1st, field coat of superior graphite natural color; 2nd, field coat of No. 72 superior grey paint. The steel encased in the concrete was not painted.

The contract for the structural steel work was let to the McGregor & McIntyre Company at the following prices:—

836,346 lbs. steel at 4.3c per lb.	\$35,962.88
455 lin. ft. handrail at \$3.25 per ft.	1,478.75

\$37,441.63

The contract was let for the substructure and floor, exclusive of paving, to Scott & Law for \$27,000.00, piling at 40c per ft. and extra concrete at \$9.00 per yd. and extra excavation at 50c per cubic yard. The waterproofing, included in the \$27,000.00 contract, was laid by the Canada Floors Company, Ltd., "Sarco" waterproofing being the brand used. The price paid for this work was \$2,450.00, being at the rate of \$1.75 per sq. yd. The concrete quantities were as follows:—

2 abutments.....	1,566 cu. yds.
2 piers.....	710 cu. yds.
Floor.....	629 cu. yds.

2,905 cu. yds.

Reinforcing steel—53,400 lbs.

Piling—596 piles—15,542 lin. ft.

Summary of cost:—

Steelwork.....	\$37,441.63
Concrete.....	27,000.00
Piling.....	6,216.80
Engineering, extras, etc.....	9,341.57

Total..... \$80,000.00

The designing, supervision and inspection of all the work was done by the staff of the railway and bridge section of the Works Department of the City of Toronto. R. C. Harris is Works Commissioner.

* Read before the University of Toronto Engineering Society, Dec. 2nd, 1914.

ENGINEERING SOCIETY MEETING

Dedicated to

The Memory of the late Dean John Galbraith, M.A., LL.D.

On Wednesday evening, December 9th, an open meeting of the Engineering Society was held in Convocation Hall. This meeting was dedicated to the memory of the late Dean Galbraith and was addressed by Mr. G. H. Duggan, '83, Dr. T. Kennard Thomson, '86, President Falconer and Dean Ellis.

President Gray in his introductory remarks referred briefly to the work which Dr. Galbraith had accomplished by virtue of his remarkable ability, his diligent application to his duties, and his faithful adherence to his high ideals. He said, "If at this meeting we will instil in our own minds and hearts some of the ideals which the late Dean so worthily upheld, then the meeting shall not have been in vain. The members of the Society are grateful indeed to Mr. Duggan and Dr. Thomson for their kindness in coming so far to help the students and graduates in handing down to posterity the memory of the man, who had merited and won the esteem and affection of all those who were so fortunate as to have him as a teacher or friend.

Mr. Duggan was one of the late Dean's early students, graduating in 1883. After graduation he was assistant to Dr. Galbraith for some time and so had come to know him very well indeed. His close association with him had given him an exceptionally good opportunity to realize the sterling qualities of the man whom he had always held in the most profound respect.

Mr. Duggan was followed by Dr. Thomson, an extract of whose address follows:—

"I thoroughly appreciate the honor of being invited to say to

you to-night what we all think of our late beloved Dean, John Galbraith, but it is to be regretted that an orator was not selected, for there are many such among our graduates.

When your able professor, Mr. C. H. C. Wright, whom I remember as a freshman at the head of his class, brought me your extremely flattering invitation, I explained to him that I was not big enough a man for the purpose. He said that he knew it, having known me for nearly thirty years, but that he also knew that there was not a man in the world who could do justice to the memory of Dean Galbraith.

Montreal has the honor of being the birthplace of our late Dean, who was born of Scotch parents in 1846. He obtained his early education at the Port Hope Grammar School, and as a boy worked for Mr. George A. Stewart, the father of our genial and able professor.

Mr. Stewart lent him a copy of Rankine's 'Civil Engineering.' This book was a revelation to young Galbraith, who began to realize what a deep subject engineering was; having determined to study that profession at the University of Toronto, he was very much disappointed to find that the course existed here only on paper.

Not being able to get an education as a civil engineer in Canada, he decided to take an Arts course. He was graduated from the University of Toronto in 1868, when he won the Prince of Wales Prize for General Proficiency, the gold medal and other prizes for mathematics.

In the meantime, as Col. Ponton told you last winter, young Galbraith was out on a survey when the call came for volunteers to quell the Fenian Raid. Both he and his chief wanted to enlist, but both could not go without breaking up the party, so it was decided that the best fighter should go to war.

The future Dean left for the front after a conference in an open space that evening.

On leaving the University he apprenticed himself at once to Mr. Stewart, who qualified him as a Provincial and Dominion Land Surveyor in 1871. Thus he acquired the best education and training then obtainable in Canada, for an engineer.

From 1871 to 1878 young Galbraith worked hard and gained much experience in the practice of engineering on the Midland, Intercolonial and Canadian Pacific Railroads, as well as in private practice.

During the latter part of his railroad work, he came much in contact with the late Mr. James Ross, a very successful engineer, manager, and then financier on a large scale.

Mr. Ross was an exceptional judge of character, and in 1883 said that he considered Professor Galbraith to be an unusually capable engineer and that he would not advise any boy who was fortunate enough to be graduated by him to strive for any further University education—though he thought a year or so of travel in Europe would be time well spent.

The ten years in the active practice of his profession convinced

Mr. Galbraith, all the more, of the great necessity of an engineering school in Canada, and his cherished ambition was finally attained in 1878, when he, with the aid of Dr. Ellis, his lifelong friend and fellow teacher, to whom we owe so much, founded the School of Practical Science. He also had the hearty co-operation of Professors Loudon, Baker and Chapman of the University proper.

We can scarcely realize the many and enormous difficulties with which we had to contend, one of which was the ignorance of the public—an obstacle to all great undertakings. This was exemplified, as he used to enjoy telling, by the fact that a would-be pugilist called to enquire about the terms for a course in practical science, which he assumed meant boxing.

In those days he had no precedents to guide him. He was a pioneer in every sense of the word; studying each day the subjects in which he was to instruct the students in his lectures—since that time was practically before the days of text books.

Even without knowing this, however, one must marvel at his keen foresight, from the very beginning, in laying out the courses.

In those early days Professor Galbraith gave the lectures on all the engineering subjects, which wide range could only have been accomplished successfully by a man of extraordinary ability.

His success was such that there is not one of the early graduates who, after twenty-five years and more in the practice of his profession, does not feel that the instruction received from Professor Galbraith was of far greater value than could be obtained from any course in the best modern university, where the larger classes prevent the professors from giving so much personal attention to each student.

He told us from the start that he was not turning out full fledged engineers; that it was farcical to give a boy a degree of C. E. the day he was graduated: that he could only teach us how to study, so that, years afterward, by dint of careful study and hard practical experience, we could teach ourselves to become capable engineers.

Another piece of good advice he gave to many, was not to try to secure a permanent position on the day of graduation, but to move around from one kind of engineering work to another, for some ten years or so, until we found what we were best fitted for. There is nothing so sad as "a square peg in a round hole." It is also advisable to secure an increase in salary with every change, on the principle that the higher the salary the better the experience, since the employer can be depended on to give the most important work to the best paid men.

I never heard of the Dean's telling any one to be honest, truthful, and faithful to his employers, employees, family and friends, and yet, somehow, he made every one of us feel that he wished this, and that he hoped we would be able to live up to his high standard as nearly as our ability permitted.

For instance, I have heard him entertain a small child by quoting verses from 'Pinafore,' to show how industry might be

rewarded in the 'Queen's Navy.' No trace of a moral was even hinted at, nor did the adults who heard him at the time suspect one; and, just so, the older boys and men received the inspiration from him without knowing it at the time.

A year or two ago I asked the Dean how it was that he had given up his canoe cruises in the wilds of the North, of which I knew he was very fond, for I had the pleasure of making from his very careful and complete notes, a map of his trip of 1881.

On this trip, which covered about three hundred and fifty miles, from Rupert's House (St. James Bay) to Lake Mistassini, he noted the great disturbance of the magnetic needle at certain places, indicating the presence of metal, where much has since been found.

He did not answer my question directly, but gave me a long account of how two of his friends had taken a similar trip and had been delayed several months on their return journey; and then he described minutely how worried and alarmed their families and friends had become. The inference was that he did not wish to give his wife and children cause for anxiety.

The Dean was exceptionally fortunate and remarkably few of the great men of the world have been so blessed, when he married the beautiful and capable sister of his friend, Mr. R. J. Stupart.

On the twenty-second day of last July, in the early hours of the morning, he peacefully passed away in that beautiful spot on the Georgian Bay, well named by him 'Go Home,' near to Nature, which he loved so well. His actions to the very last showed one of his dominant characteristics—consideration for those about him.

While he is greatly missed by family and friends, we all know that the work of his lifetime was completed in a manner seldom granted to man, and that he would have much preferred to have died in harness than to have lived on in enforced leisure due to impaired health.

I have referred to this as the oldest engineering society in Canada, and might remind you that this organization was formed in 1885, one year earlier than the Canadian Society of Civil Engineers. It was due to Professor Galbraith; and this is how it came about:

When we of the Second Year Class were discussing the idea of an Engineering Society, we were told that the Third Year men had thoroughly considered the matter the year before, and had abandoned it as hopeless for such a young School; for, even in 1885 there were only twelve graduates of the S.P.S., and only sixteen students then in the School who afterwards were graduated, so the subject was dropped.

A few weeks later I invited Professor Galbraith, Dr. Ellis, the Third and Second Year boys, as well as a few outside friends, such as the now eminent Toronto attorney, Mr. David T. Symons, the late medical genius, Dr. James D. Thorburn—to dinner, and after we had finished our coffee, I asked why we could not form an Engineering Society. Professor Galbraith rose immediately, settled the question at once and for all, and advised us to appoint a committee then and there to draw up a constitution and by-laws. His suggestions were carried out without delay.

As it was realized that it was necessary to start right, Professor Galbraith was persuaded to take the presidency for the first three years. Then he saw and recognized the merit of young Haultain, now your distinguished professor and one of the foremost mining engineers in America, and insisted on retiring in his favor.

His interest, however, never flagged, and more than once his assistance prevented disaster. One of these occasions was when he saved the society from a very serious financial difficulty, by undertaking to have one dollar a year collected from every student of the school.

I do not believe that ex-President Galbraith ever missed one of our annual banquets. This is quite a record for such a busy man and he was too modest to realize how much his absence would have been felt.

At one of these banquets some twelve years ago, I heard him address the boys, who had been at 'Loggerheads' with the faculty—I have forgotten what 'the tempest in the teapot' was about—but Principal Galbraith explained it in his usual clear-cut, manly, straightforward fashion, and then told the story of the Irishman who was riding a mule, which had tried every conceivable trick to get rid of him. Finally the mule got one of its hind feet caught in the stirrup. Pat looked down and said, 'Begorra, if you are going to get up, I think that I had better get off.' Dr. Galbraith then continued, 'but I would like to assure the students that the faculty is not going to get off.'

He had struck the right chord, as usual, and when the echo of the whole-souled applause had ceased, the friction was over.

The next annual dinner which I had the honor of attending was that great banquet of 1909, at which 830 were present. That was the time when you had invited the members of the Canadian Society of Civil Engineers, of which organization our Dean was a founder, councillor for many years, and, at that time, an honored president. This was in the second year of the presidency of Dr. Falconer.

We older boys had been quite worried for fear that the Senate might go outside of Canada for a president, but, thank God, they did not. Be well advised and always insist on having a native born Canadian for the presidency of this great University; and let me tell you that it is so considered by all Americans, the degrees granted here being highly esteemed in the United States.

Also insist, and this is of vital importance, that the future Deans shall be **native born Canadians and engineers.**

Many were the graduates who took long trips to attend that banquet, for the pleasure of meeting Dr. Falconer and, at the same time, showing him what we thought of Dean Galbraith.

The students that night were certainly 'feeling their oats'; they were not silent, but it was a sincere pleasure to us all to see how well the new president of our Alma Mater stood the ordeal—and won out. A weaker man, in his place, and the pleasure of the evening would have spoiled. I do not believe that even our former

president, Sir Daniel Wilson, who, as you all know, was an exceptionally strong character, could have held these boys in check. The students had simply 'sized up' the new President and, instinctively had given him their respect and loyalty.

After the feast was over—and it was well on in the morning—a group of us were still discussing the great success, when a graduate of another university asked why his college could not give such an entertainment. He was answered by one of his fellow graduates, that it was merely because they had no Galbraith.

The only other of our annual reunions which I was fortunate enough to attend was that of December fifth, last year; having left a conference in Richmond, Virginia, and missed a hearing before the Senate in Washington, to get here—though that was nothing more than what many another graduate had done for the same purpose.

Most of you know what a treat it was to see and hear our Dean that night. As usual, he had not prepared a speech. That he was touched to the bottom of his heart was obvious to all. He told us the history of his life work, his early struggles to start and build up the School of Practical Science—our dear old S. P. S.

We had the good fortune that evening, to be able to watch his strong, kindly face, while he was speaking, and at the same time see what an impression that life story of his work made on President Falconer, and we realized that our president knew and appreciated the greatness of our dean.

It was also a source of much gratification to hear Sir Edmund Walker, Dr. J. A. Macdonald, Col. Ponton and the others, and to know that they, the great Canadian bankers, editors, military men and others, also appreciated the sterling worth of the most modest great man we have ever known.

Although the graduates and students knew how the Dean was loved, revered and respected, the demonstration given that night was music in the ears of all.

A fitting climax to that memorable evening, which we fondly hoped would be followed by many another, when we would again and again be able to attend to hear our dear Dean and let him know we still valued his friendship, was the reception he gave to us in the Old School, on the following afternoon, when we saw him in the midst of his charming family and friends.

It was always a pleasure when attending these functions, Mr. President Gray, to see how well they were presided over, and with what care the big and little matters were attended to, one of the most graceful incidents being the presentation of a beautiful basket of flowers to Mrs. Galbraith last December. Verily the founders of this Engineering Society "builded better than they knew."

The Canadian Club of New York and the University of Toronto Club of the same city, never lost an opportunity to invite Dean Galbraith to their banquets, and he never attended without giving pleasure to all; and when he sat at the table with the great financiers, statesmen, and other strong men of affairs, he was surpassed by none.

The Dean, like all true Canadians and Scotchmen, was loyal

to the land of his birth and the land of his ancestors, and devoted to his parents. He was also devoted to his wife and children, and as true a friend as man, woman or child ever had.

He knew and appreciated the Indians and French Canadians, and was adopted into several Indian tribes, as a mark of their esteem and friendship.

On his last trip to the North he was the first white man to run the falls and rapids, then named after him, La Grande Chaudiere de Galbraith, Riviere Achammonchonan.

He had such a keen and genial humor and never tired of telling and hearing good stories.

He was such a hard worker that we never understood how he got asleep enough to keep his health.

As a student he was one of the organizers of the first Science Club of the University of Toronto.

In later years he was a vice-president of: The Ontario Land Surveyors Association, The Canadian Institute, the British Association for the Advancement of Science, and so on.

Many, if not all, the Dean's writings, such as 'The Function of the School of Applied Science in the Education of the Engineer,' should be republished in the APPLIED SCIENCE.

On the collapse of the Quebec Bridge, he was one of the three commissioners selected by the Canadian Government to make a report on the accident. Seven months of the most careful investigation and study resulted in what is considered one of the ablest, fairest and most scientific, as well as most humane reports ever made.

He considered it his duty to the Government and the University to accept this honor. As a rule, however, he refused all private practice that might possibly interfere with his work for 'The School.'

Some years ago he discussed the remuneration in the American Universities, and to the engineering profession generally, and though he fully realized that he could have made far more money (he would have made ten times as much) by going to the United States or entering private practice, he said that nothing could ever compensate him for what he would lose if he left the S.P.S., which he loved so well.

In brains, heart, faithfulness, industry, intuition of character, keen foresight, and executive ability, he was second to none, and he had the admiration, respect and love of all who were fortunate enough to know him, in a measure seldom granted to man."

In his remarks President Falconer said:—"The first occasion on which I met the late Dean Galbraith for the purpose of any conversation was in a class-room of the Faculty of Applied Science in June, 1907. Dean Ellis was also present. Our conversation turned upon the methods by which science should be taught to engineers. While he maintained strongly that the engineer should be turned out scientifically expert, he held that the teaching of science should be made as concrete as possible, and that it should be done by men who were acquainted with the practical problems that face the engineer. I realised soon that the method that Dr.

Galbraith held and very ably maintained, was a view that is widespread among schools of engineering. He also spoke to me again and again, during these last seven years, of his conviction that the course of Applied Science should not be regarded as producing engineers. Its whole purpose was to train men scientifically, to make them thinkers, so that they may become engineers afterwards when they get out into the practical life of the world. He also lamented constantly the number of subjects that were placed in the course, holding that a few subjects well mastered give a man thinking power and offer him the best training. In this he showed himself the right kind of teacher.

Dr. Galbraith's method in the direction and upbuilding of the School of Practical Science bore the imprint of his own sincere character. He did not copy other places, taking for example the calendars of the Massachusetts Institute of Technology or Cornell, and repeating in Toronto their arrangements. He studied the local situation and provided for emergent needs. When the mining development of the North required mining engineers he strengthened that department. For the demands of the workers in clay products he sought to provide instruction in ceramics. The result of this procedure has been that there is nothing useless to be cut out of the present Faculty of Applied Science. It was established upon the needs of the Province by a man who was both reasonable and independent. He would listen to new proposals, weigh and accept or dismiss them with exceedingly good judgment arising from a wide experience. The successor of Dean Galbraith has a solid foundation on which to build.

"It is not necessary for me to say anything further as to his character. He got his reward not in wealth, which is ephemeral, but in the affection of his students which is permanent. He was the centre of the annual dinner of the Engineering Society. Old graduates came back to it year after year because the Dean was there."

Dean Ellis followed President Falconer with an interesting address in which he recalled many incidents in the life of Dr. Galbraith, whom he had always considered a most cherished companion and friend. Many obstacles of considerable magnitude had confronted the late Dean in the accomplishment of his work, but his persistent perseverance and his unity of purpose had earned for him a reward such as few men attain.

A. J. Dates, B.A.Sc., '13, is in Detroit, U.S.A., with the State Railway Commission of Michigan.

Fred. Alport, B.A.Sc., '06, is with the second Canadian contingent, in the Third Field Troops, Royal Canadian Engineers.

F. C. DeGuerre, B.A.Sc., '11, is assistant to the city engineer, North Vancouver, B.C.

Major J. L. R. Parsons, '01, of Regina, Sask., is in training with the second contingent, which he intends to accompany to Europe.

D. A. Smith, B.A.Sc., '04, is at Salisbury Plain, England, with the first Canadian contingent.

BOOK REVIEW

Structural Engineers' Handbook. Data for the Design and Construction of Steel Bridges and Buildings. By Milo S. Ketchum, C.E. Leather, 6½ x 9 inches; 916 pages; 260 tables; 400 illustrations. New York, McGraw-Hill Book Company Inc. \$5.00 net.

The author of this book presupposes a knowledge of mechanics and of the methods employed in calculating stresses in members of structures. It is sub-divided into Part I and Part II, the former containing a wealth of data and details for the construction of steel bridges and buildings and the latter consisting of 280 pages of tables, a number of which were compiled specially for this book.

The book is intended for the structural engineer and for the student in engineering who has had a thorough course in applied mechanics, and will prove of immense value to graduates who are engaged in structural work, especially on steel bridges and buildings. No reference, however, is made to swing and movable bridges or cantilever and suspension bridges. Chapter VII is devoted to a study of timber bridges and trestles such as are temporarily required during the erection of steel structures. Chapter VI treats of the design and construction of foundations for bridges.

Details and data selected from a wide range, many of which have not heretofore been accessible to the public, are furnished for the designer and the draftsman. Chapter XIV on the erection of steel structures contains a great deal of valuable information and the greater part of this chapter is now available to the public for the first time. Part I also contains chapters on retaining walls, steel bins, steel grain elevators, steel head frames and coal tipples, steel stand-pipes and elevated tanks on towers as well as chapters on bridges, buildings, estimating, detailing and general designing.

One desirable thing which it appears to us to lack is a chapter on steel power-transmission towers, especially in view of the fact that so much work of that nature is being carried on now. However, the fields of work which have been treated are most thoroughly covered and the book will prove exceedingly valuable to those interested in structural engineering.

THE O.T.C. SONG

Tune—"Solomon Levi."

The warlike spirit has entered the professors of the "School,"
They will soon want the college run by military rule.
Three nights a week they're out to drill; it's a glorious sight to see,
They're out getting ready for a trip to Germany.

CHORUS—Oh! Our professors, what an army they will make,
Poor old Kaiser William, how his knees will shake.
When he sees this regiment advancing, through the Fatherland,
Marching to the music of a captured German band.

Professor Loudon takes a gang to Buffalo every year
 To give the third year man a taste of American lager beer—
 They go to see the rolling mill and to watch the white hot steel
 And raise the roof at Statler's, where they go to get a meal.

Oh! Tommie Loudon, he sure is a popular chap.
 He'll lead our professors, when they push Germany off the map.
 For he'll soon have the rank of General in the Officers' Training Corps,
 Then he'll give up teaching Statics, and go to run the war.

Professor Cockburn built a tug down on Toronto Bay
 And now he'd like to arm it with guns and let it sail away,
 Away across the ocean to fight with Germany,
 And he'd put the Kaiser cruisers to the bottom of the sea.

Oh! J. Roy Cockburn, what a clever man is he,
 He'll take our professors on his tug to Germany.
 He'll take the rank of Admiral away from Fisher and Jellicoe
 And show by Descriptive Geometry the way to sink the foe.

E. V. D.

O. G. Lye, B.A.Sc., '14, is with the Provincial Board of Health of Ontario at the Experimental Station on Clifford St., Toronto.

H. S. Kerby, B.A.Sc., '14, is in charge of a party doing hydrographic survey work in Alberta. His address is Mount Royal College, Calgary, Alta. Mr. Kerby intends to accompany the second contingent with the Canadian Aviation Corps.

A. J. Gray, B.A.Sc., '13, accompanied the first contingent as lieutenant with the 50th Highlanders.

J. H. Lindsay, '07, is district surveyor and engineer for the Public Works Department, District of Prince Albert.

J. R. Gill, B.A.Sc., '14, has a practice as an Ontario land surveyor and engineer, at Sudbury, Ont.

J. B. Goodwin, B.A.Sc., '92, is assistant hydraulic engineer, Hydro-Electric Power Commission of Ontario, Toronto.

A. W. Lamont, B.A.Sc., '09, is sales engineer, Canadian Westinghouse Co., Winnipeg, Man.

WANTED

A mining graduate with some experience in ore-dressing. Apply at once to J. E. Ritchie, Engineering Society Employment Bureau.

WANTED

Three good mechanical men, preferably with experience in making gauges. Apply immediately to M. Beatty & Sons, Welland, Ont.

APPLIED SCIENCE

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EDITORIAL

MONTREAL TOIKE OIKE CLUB

The Montreal Toike Oikes held the first dinner of the season at the University Club on the evening of the 17th inst. The guest of honor was Professor Gillespie. The chair was occupied by the president, Walter J. Francis. The two past presidents, G. H. Dugan and R. A. Ross occupied seats at the head table. There were thirty-one Toike Oikes present, among whom were J. M. R. Fairbairn, H. Rolph, J. A. DeCew, D. C. Tennant, W. D. Black and H. W. Sutherland. A most enjoyable evening was spent at the club, where Professor Gillespie gave a twenty minute chat on current events at the School since the last Montreal dinner. At 8 o'clock the party adjourned to the rooms of the Canadian Society of Civil Engineers directly opposite, to hear Professor Gillespie deliver an

illustrated address on Two-Storey Sewage Treatment Plants. H. W. Sutherland was elected secretary-treasurer in place of E. R. Watts, who has removed from Montreal. The gathering was a most enjoyable one.

OBITUARY

Charles W. Dobbin

It was with deep regret that the many friends of Mr. Charlie Dobbin, son of Mr. and Mrs. R. O. Dobbin, Waterloo, learned of his demise at his home on Sunday morning, November 22nd. Deceased, who was a member of Class '15, in electrical engineering,



Charles W. Dobbin

was obliged to discontinue his studies about a year ago, owing to ill health, and although he took a complete rest he failed to regain his former vitality. He fell a prey to tuberculosis of the lungs and spent some time at the Sanitarium, Muskoka, but returned later to his home where he was confined to his bed for seven weeks before the time of his death.

Mr. Dobbin was born in Breslau in February, 1888, where his parents then resided, the family removing to Waterloo about a year later. After matriculating from the Berlin Collegiate Institute, he was engaged for three years at the waterworks as engineer. Being naturally inclined toward matters of a practical nature, he decided to take a course in engineering and he gave much promise of a successful future in his profession if he had been spared to realize his ambitions.

Deceased was very fond of music and devoted a good deal of his time to it, his favorite instruments being the piano and the violin. For several years he sang in the Waterloo Methodist Choir, and while at the University he was a member of the University Glee Club and a member of the Orchestra of the "School."

The funeral was conducted from the family residence on Tuesday afternoon, December 24th, to Mount Hope Cemetery, where interment took place.

A feeling of sadness comes over us at the termination of so promising a young life, and we extend to his parents and brothers our sincere sympathy in their bereavement.

MARRIAGES

Isbister-Lamont

On Wednesday, November 25th, Mr. J. Isbister, B.A.Sc., '09, was married to Miss Margaret Lamont, daughter of Mr. and Mrs. Donald Lamont, Gravenhurst, Ont., at the home of her parents. Mr. and Mrs. Isbister will reside in Onaway, Mich., where Mr. Isbister is now located.

Kinghorn-Zollner

On Saturday afternoon, December 19th, Mr. A. A. Kinghorn, B.A.Sc., '07, president and general manager of the Asphaltic Concrete Co. of Toronto, was united in marriage to Miss Valborg Martine Zollner, daughter of Mr. A. Zollner, in Trinity Methodist Church by Rev. Dr. W. H. Hincks. After their return from a trip to points in the States, Mr. and Mrs. Kinghorn will reside on Westminster Avenue.

Bain-Davidson

On Tuesday, December 29th, at the home of the bride's parents, Mr. James Watson Bain, B.A.Sc., '96, Associate Professor of Applied Chemistry, was united in marriage to Miss Margaret Garden Davidson, daughter of Mr. and Mrs. William Davidson, Toronto. Mr. and Mrs. Bain left later for a trip to Atlantic City and New York.

DIRECTORY OF THE ALUMNI

T

Tasker, R., '13. We do not know how he is employed.

Tate, H. W., '09, is director of surveys for the Ottawa and Hull civic planning commission. Address Y.M. C.A., Ottawa.

Taylor, R., '11, is demonstrator in electrical engineering at University of Toronto.

Taylor, T. F., '02, is designing engineer for the city of Toronto on the Bloor St. Viaduct, Toronto. Address is 494 Concord Ave.

Taylor, W. V., '93, address not known.

Taylor, A., '00, has a practice as engineer and surveyor, Box 555, Portage La Prairie, Man.

Taylor, J. W. R., '08, is erecting engineer for the Canadian Westinghouse Co.

Taylor, W. E., '08, is engaged in contracting in Toronto.

Teasdale, C. M., '02, has a private practice as surveyor at Concord, Ont.

Teeter, W. M., '10, is with the Jefferson Glass Co., Carlaw Avenue, Toronto.

Temple, J. B., '11, his address is 238 Gladstone Ave., Toronto. He is structural engineer for the Toronto Iron Works, Toronto, Ont.

Tennant, D. C., '99, is chief draughtsman with Dominion Bridge Co., Lachine Locks, P.Q.

Tennant, W. C., '00 (deceased).

Teran, E. A., '10, his home address is Arthur, Ont. He is construction engineer for the Canadian General Electric Co.

Thom, W. H., '10, is factory manager Lyman's Drug & Chemical Co., Toronto, Ont.

Thomas, G. C., '11, his address is 167 College St., Toronto. He is in the employ of the Hydro Electric Power Commission of Ontario.

Thomas, V. C., '08, his address is 28 Langley Ave., Toronto.

Thompson, P. M., '07, his address is 54 Thorold St., Toronto.

Thompson, E. A., '09, is with the Dominion Bridge Co., Lachine Locks, P.Q.

Thompson, J. M., '13, is with the Hamilton Bridge Works Co., Hamilton, Ont.

Thompson, H. B., '10, is taking a post-graduate course in structural engineering at the University of Toronto.

Thompson, W. K., '13. We do not know how he is engaged.

Thompson, R. M. A., '10, is with the Hydro Electric Power Commission of Ontario, Continental Life Building, Toronto.

Thomson, D. J., '13, is demonstrator in mechanical engineering, University of Toronto.

Thomson, T. K., '86, is consulting engineer at 50 Church St., New York.

Thomson, R. W., '92, is in Vancouver, B.C., where he has a practice as mining engineer.

Thomson, S. E., '04, address not known.

Thomson, L. R., '05-'07, is with the Dominion Bridge Co. at Montreal, P.Q.

Thomson, J. E., '06, his last address on our files is 57 Queen's Park, Toronto.

Thomson, O. R., '07, is superintendent of the Sidney Electric Power Co. Limited, and superintendent of sub-stations for the Electric Power Co. Limited. Address is care of Electric Power Co., Trenton.

Thorne, S. M., '00, is manager of Preston East Dome Mines, Cobalt, Ont.

Thornley, J. H., '08, his address is 843 Dundas St., London, Ont.

Thorold, F. W., '00, is a member of the firm F. W. Thorold Co., Limited, consulting engineers and contractors, 2 Toronto St., Toronto. Special attention is given to sewage disposal and water supply problems.

Tillson, E. D., '05, his address is Hotel Albert, New York, N.Y.

Tipper, G. A., '09, has a practice as contracting surveyor at Brantford, Ont.

Titus, C. G., '10, address not known.

Toms, C. G., '08, of 12 Rusholme Rd. Cres., Toronto, is general manager of the Toms Contracting Co. Limited, Toronto.

Torrance, R. D., '11, is with Frid Lewis Co. Limited, contractors, 901 Somerset Block, Winnipeg, Man.

Torrance, T. E., '13, is with the Bell Telephone Co., Toronto.

Tough, W. G., '11, is sales engineer for the Roman Stone Co., Limited, Toronto.

Townsend, C. J., '04, is a member of the firm Wilson, Townsend & Saunders, engineers and contractors, 78 Spadina Ave., Toronto.

Townsend, D. T., '04, is chief surveyor in the department of natural resources for the Canadian Pacific Ry. Co., at Calgary, Alta.

Train, C. N., '09, is with the Nipissing Mine, Cobalt, Ont.

J. J. Traill, '05, is lecturer in hydraulics at University of Toronto.

Treadgold, W. M., '05, is assistant professor in surveying at University of Toronto. He is also town engineer, Brampton, Ont.

Trees, S. L., '03, is manager of the Whitby factory for S. L. Trees Co. Limited.

Trees, A. G., '09, is superintendent of the factory of S. Trees Co. Limited, at 42 Wellington St. E., Toronto.

Tremaine, R. C. C., '95 (deceased).

Trimble, A. V., '04, is with the Hydro Electric Power Commission Toronto.

Tucker, B. B., '04, is with the Rapids Power Co. at Morrisburg, Ont.

Turnbull, W. G., '09, is chief engineer for the Turnbull Elevator Co., Toronto, Ont.

Turner, W. E., '05, is with the Utah Light & Ry. Co., Salt Lake City, Utah.

Tye, H. W., '08, is in the C.P.R. construction department, Winnipeg Man.

Tyrrell, J. W., '83, is a member of the firm Tyrrell & McKay, consulting engineers and surveyors, Hamilton, Ont.

Tyrrell, H. G., '86, is consulting engineer at 817 Hinman Ave., Evanston, Ill.

U

Umbach, J. E., '03, is chief draughtsman in the lands department at Victoria, B.C.

Underwood, J. E., '09, is a member of the firm McArthur, Murphy & Underwood, Saskatoon, Sask.

Ure, W. G., '13, is assistant to the city engineer at Stratford, Ont.

Uren, A. E., '05, is editor, with the Acton Publishing Co. Limited, Toronto.

V

VanAllen, K. M., '10, was engaged in fruit ranching at Summerland, B.C., when last heard from.

Van Every, W. W., '99, is city engineer at Sault Ste. Marie, Ont.

Van Norman, C. P., '08-'09, of 282 Carlton St., Toronto, is resident engineer for the Toronto and York Radial Ry. Co.

Van Nostrand, J., '09, is a member of the firm Speight & Van Nostrand, Temple Building, Toronto.

Vatcher, A., '09, is with the Reid Newfoundland Co., Freshwater, Bay de Verde, Nfld.

Vaughan, J. M., '05, of 58 Melville St., Toronto, has a business as a contractor.

Venney, L. T., '10, his last address on our file is 156 Garry Ave., Winnipeg, Man.

Vercoe, H. L., '98, his last address on our file is 109 McCaul St., Toronto.

Vickers, N., '11, is with the Highway Commission of Saskatchewan at North Battleford, Sask.

Vickery, C. L., '06, is chief engineer for the American Thread Co., Fall River, Mass.

Villeneuve, T. L., '08, address unknown.

Von Gunten, C. F., '13. His home address is Blenheim, Ont.

W

Wade, E., '04, is a building contractor at Welland, Ont.

Wagner, N., '10, is in the Bridge Department of the Canada Foundry Co., Toronto.

Wagner, W. E., '99, of 21 Gerrard

St. E., Toronto, has a practice as engineer and contractor.

Wagner, H. L., '05, is chief draughtsman for the Toronto Structural Steel Co. Limited, Toronto.

Waite, J. H. C., '11, is surveyor for the Cobalt Comet Mine, Cobalt, Ont.

Walcott, W. D., '11, is with the Public Works Department of the Jamaica Government, as surveyor on road location and other miscellaneous survey work. His address is Savanna-la-mar, Jamaica.

Waldron, J., '03, has a practice as civil engineer and surveyor at Moose Jaw, Sask.

Walker, E. W., '04, deceased.

Walker, R. M., '10, is with W. J. Francis & Co., 232 St. James St., Montreal, P.Q.

Walker, W. J., '07, is with T.C.R., at Grant, Ont.

Walker, J. A., '08, has a practice as civil engineer and surveyor at McBride, B.C.

Walker, C. M., '09, is engaged in Dominion land survey work at Banff, Alta.

Wallace, G. L., '11, is demonstrator in physics at the University of Toronto.

Walton, T., '10, deceased.

Wanless, A. A., '02, is assistant engineer and shop superintendent for the Nova Scotia Steel & Coal Co., Sydney Mines, N.S.

Wardell, A., '11, is on the designing staff of the Toronto Iron Works, Toronto.

Warrington, G. A., '10, his address is Cornwall, Ont.

Wass, S. B., '03, is chief engineer for the St. John & Quebec Ry., and also chief engineer for the Quebec Extension Railroad at Fredericton, N.B.

Watson, F. E., '11, of 447 Manning Ave., Toronto, is demonstrator in drawing at the University of Toronto.

Watson, M. B., '10, assistant engineer with the Public Roads and Highways Commission of Ontario at the Parliament Buildings, Toronto, is with the first Canadian contingent in Europe.

Watson, R. B., '93, deceased.

Watson, J. P., '04, is on the staff of the St. Lawrence Bridge Co., Limited, Beardmore Building, Montreal.

Watt, G. H., '99, has a practice as Dominion land surveyor, Ottawa, Ont.

Watts, R. E., '13, is with the Dominion Bridge Co., Montreal, Que.

Waugh, B. W., '08, is with the Department of Interior, Ottawa, Ont.

Webb, C. E., '09, his address is 227 Spadina Rd., Toronto.

Webb, E. E., '09, has a contracting practice at Orillia, Ont.

Webster, C. A., '14, is with Sheldon's Limited, Galt, Ont., manufacturers of heating and ventilating equipment.

Wedlake, R. M., '08, is with the Cockshutt Plow Co. Limited, Brantford, Ont.

Weeks, M. B., '97, is with the Department of Public Works at Regina, Sask.

Weir, H. M., '00, address not known.

Weir, J. M., '04, of 6 Fairview Blvd., Toronto, is secretary-treasurer of the Toronto Plate Glass Importing Co., Limited, 91 Don Roadway, Toronto.

Weir, R. P., '08, of 170 Geoffrey St., Toronto, is the Canadian manager for Cutter Electrical & Manufacturing Co., Philadelphia, Pa.

Weldon, E. A., '97, is in business as investment broker, 711 McIntyre Block, Winnipeg.

Welford, P. G., '11, is with the Hyatt Roller Bearing Co., Newark, N.J.

Wells, A. F., '04, is a member of the firm Wells & Gray, engineers and contractors, Confederation Life Bldg., Toronto.

West, A. M., '08, is city engineer, North Vancouver, B.C.

Wheler, A. G., '11. His address is Norfolk, Va.

White, E. V. H., '08, is contractor on docks and wharves at Burlington, Ont.

Whelihan, J. A., '03, address not known.

White, A. V., '92, whose address is 2 Earl St., Toronto, is consulting engineer, engaged upon work for Commission of Conservation, Ottawa, and for International Joint Commission.

White H. F., '03, address not known.

White, W. R., '08, address not known.

White, W. J., '08, address not known.

White, F. C., '09, is on the staff of the Canadian Bridge Co., at Walkerville, Ont.

White, H. M., '10, is in charge of one of the drafting rooms for the Dominion Bridge Co. at Montreal, Que.

Whitelaw, A. R., '09. His address is 10720 103rd St., Edmonton, Alta.

Whiteside, J. L., '10, address not known.

Wickens, W. S., '10, is demonstrator in drawing at University of Toronto.

Wickett, T., '89, is a physician, 25 Nightingale St., Hamilton, Ont.

Wickett, W. E., '06, deceased.

Wiggins, T. H., '90, is civil engineer and Dominion land surveyor, Saskatoon, Sask.

Wilkes, E. D., '07, is in the main drainage department at the City Hall, Toronto.

Wilkes, G. H., '11, is in Winnipeg, Manitoba.

Wilkinson, T. A., '98, is statistician for the Westinghouse Church Kerr Co., New York, N.Y.

Wilkinson, R. G., '09, his address is Aberader, Ont.

Williams, C. G., '03, is at Cobalt with the Deister Machine Co. of Fort Wayne, Ind.

Williams, E. R., '11, is at Shawinigan Falls, Que., with the Northern Aluminum Co.

Williams, J. A., McK., '09, is with A. E. Ames & Co., bankers and brokers, Toronto.

Williams, G. K., '10, is demonstrator in drawing at the University of Toronto, Toronto, Ont.

Williamson, O. T. G., '09, is with James Stewart & Co., Westminster Building, Chicago.

Williamson, D. A., '98. The last address on our file is care of Y.M.C.A., Ottawa, Ont.

Wilson, H. A., '11, is assistant superintendent for J. C. Wilson & Co., manufacturers of water turbines and power transmission machinery, Glenora, Ont.

Wilson, R. D., '01, deceased.

Wilson, N. D., '03, of 128 Glen Rd., is surveys engineer for the Toronto Harbor Commissioners, Toronto.

Wilson, J. N., '00, is with the Hydro Electric Power Commission, of Ontario, Continental Life Building, Toronto.

Wilson, A. F., '07, address not known.

Wilson, F. D., '08, is located in Toronto at present.

Wilson, J. M., '08, is resident engineer at Toronto for the Department of Public Works, Canada.

Wilson, L. R., '09, is engineer for the St. Lawrence Bridge Co. Limited, Montreal.

Wilson, F. F., '09, his address is 124 Geoffrey St., Toronto.

Wilson, W. H., '10, address not known.

Wing, D. O., '08, is engaged in land surveying. His address is 1001 Rogers Building, Vancouver, B.C.

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Workman, G. R., '10, is demonstrator in drawing at University of Toronto.

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Wright, A. J., '13, is with the Toronto Hydro Electric System in charge of line records.

Wright, C. H. C., '88, is professor of architecture at the University of Toronto.

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Y

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Young, R. B., '13, is with the Hydro Electric Power Commission in their test department on Strachan Ave., Toronto.

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Z

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